Nomenclature of Higher Taxa: a new approach

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Abstract. In the 21st century, Zoology faces many challenges. One of these is the preparation of a Code of Nomenclature that can both meet the new needs of zoologists and fill gaps in the present wording and coverage. One of these gaps concerns the nomenclature of higher taxa. After a discussion of the problems, it is proposed that the new Code should regulate names above the family-group, usually known as phylum-, class- and order-group names, and that non-typified names should be discarded gradually. A logical set of standardized connectors and endings is proposed for use in a single, 'expanded' family-group, renamed as the 'upper uninominal group'. This group would be typified by the names in the immediately inferior group (the genus-group) as is standard in the present Code. This way, the internal logic of the Principle of Typification is maintained. Different problems that may occur are identified and solutions proposed.

Introduction

The nomenclature of taxa above the family-group was a matter of debate even before the Règles of 1905 were published. A short historical and formal analysis of the problem was presented by Starobogatov (1984) in Russian and a more recent English translation (Starobogatov, 1991). He also reviewed the problems that implementation of a typified system for these names would face, discussed the advantages of such implementation and proposed a 'Draft of recommendations for the regulation of the nomenclature of taxa of rank higher than superfamily' with 40 points.

The aim of the present paper is to identify shortcomings in Starobogatov's proposal and to propose more pragmatic and Code-compliant solutions. Among the remaining problems one of the most important is that the Code does not regulate nomenclature of taxa above superfamily. This extension of coverage, seemingly, has not been undertaken for fear of the 'serious breakdown in existing customs concerning the formation and utilization of names of higher categories' (Starobogatov, 1991).

However, a more serious problem is found when the number of these taxon names will increase with the future discovery and description of the millions of species thought to be still unknown, and the need for new higher categories to rank them. Examples include the recent description of a new phylum, Cycliophora Funch & Kristensen, 1995, or a new order of insects, Mantophasmatodea Zompro, Klass, Kristensen & Adis, 2002.

Phylogenetic analysis is also playing an important role in this multiplication of names. Some authors want a name for every node or branch of a given phylogenetic tree, no matter which analytic tool has been used for its construction. I consider this

unnecessary, but I believe the Code must give exact rules for zoologists requiring names under the Linnaean binominal system. Other nomenclatural systems for phylogenetic systematics have been devised, some based on a very strict mathematical analysis of tree topology and hierarchy topology (Papavero et al., 2001). Current Linnaean nomenclature can deal adequately with the naming of phylogenetic tree-based taxa. Other systems are contrary to the Principles of the Code and will not be referred to here.

Names above the superfamily level belong, according to Starobogatov (1991), to two categories: typified and descriptive, the first being those linked by their spelling to an included genus-group taxon, the second those based on one or several features of the included organisms. A more complex approach to the attributes of the taxa can be found in Kluge's works (e.g. Kluge, 1996 in Russian, 1999 in Spanish and English), where a different structure of names of taxa is proposed. However, most of the inherent complexity affects only non-typified taxon names, for which the descriptive term may be taken in different senses depending upon the contents of their taxa, and for these I will use the term 'non-typified'. This is the only difference that affects the establishment of the rules of the Code, which is covered by the Principle of Typification.

In the following description, the term 'high-level names' encompasses the main categories (in Latin) phylum, classis and ordo, and the intermediate ranks that can be obtained exclusively by the use of the prefixes super-, sub-, infra- and parv(i)-. No name related to the category 'kingdom' is intended. The category 'cohors' as a part of the order-group should be avoided because it has been used previously at other ranks. The term 'low-level' will be used to encompass uninomina of the family- and genus-groups.

Homonymy and hemihomonymy

Two problems are inherent in the absence of nomenclatural rules for high level taxa. One is homonymy — two names in use are well known for being homonyms: Decapoda Dujardin, 1834 in Mollusca, and Decapoda Latreille, 1803 in Crustacea. Both are or have been in use at the same time, because the Principle of Priority contained in the Code does not apply to these names. If it did, only Decapoda Latreille, 1803 would be available. The number of names falling in this category is probably high, although I have not done any research to count them, since their number is irrelevant to the argument I present here. As envisaged in the present Code, homonymy is to be avoided because of the confusion it brings to scientific communication.

Hemihomonymy is a peculiar situation, described by Starobogatov (1991). This happens when a high-level uninomen and a low-level uninomen are identical, even when the high-level uninomen is not typified by a similarly spelt genus-level name. This conflict is already present between some family-group names and some genus-level names ending in *–ina*, and perhaps in some ending in *–oidea*. This is a particular feature stemming from the use of some Latin endings, which, as *–a*, can be both singular feminines or plural neuters. However, atypical generic endings in *–ae* or in *–i* could also be included in this because of the possible risks incurred (see table 1).

Starobogatov (1991) identified both the problems mentioned above as the main sources of nomenclatural problems that could be solved by the introduction of

Table 1. Latin nominative plural endings

Ending	Gender	Declension
-ae	Feminine, rarely masculine	1st
-a	Neuter	2nd, 3rd
-ia	Neuter	3rd
-ua	Neuter	4th
-us	Masculine, rarely feminine	4th
-es	Masculine or feminine	3rd, 5th
-i	Masculine, rarely feminine	2nd

typified high-level names. I think that typified high-level names will solve many other present-day problems, as it is the uncontrolled proliferation of names linked to different taxonomic concepts in phylogenetic trees, or a change of meaning for nominal taxa introduced by subsequent authors. An in-depth explanation of this issue is to be found in Kluge's (1996, 1999) criticism on the myth of the polyphyly of Hexapoda, a matter complicated by misunderstandings of meanings and ranks of non-typified taxa.

Standard endings in high-level taxa names

Starobogatov (1991) discussed earlier systems of standardization of name endings for high-level taxa names. He pointed out that a logical development would be to exclude any endings which would lead to homonymic or hemihomonymic identity. He provided a partial check of endings likely to lead to intergroup homonymies.

I present here an analysis of genus-group endings based on the recent availability of Neave's *Nomenclator Zoologicus* in electronic format as a database (http://uio.mbl.edu/NomenclatorZoologicus/). For this analysis (table 2) I differentiate between endings and connectors, from a philological point of view. I consider endings to be in this case the last 1–2 letters (two vowels or vowel plus s) or in a single case the last 3 letters (-ees) of a name. Connectors are the letters linking the stem of the type genus to these endings, e.g. in the family name RANIDAE, the stem would be ran- (from genus *Rana*), the connector –id- and the ending –ae (a first declension nominative plural). Latin plural endings and their gender and declension are shown in table 1.

Connectors have been selected from those present on tables 1–3 in Starobogatov (1991), plus the mandatory ones for family-group names in the Code. I have added most of the commonly used connectors in typified names in Zoology after a survey of Parker (1982), and of Sibley et al. (1988) for Aves.

One of the most striking points is the fact that the –a ending has been used with almost every conceivable connector as part of generic names (in fact about 50% of the generic names in zoology end in this letter). This makes a strong reason for avoiding this ending as a part of any high-level name. Unfortunately, we already have the combination connector+ending in –ina mandatory for subtribes, a combination to be found in 9,062 generic names, and similarly the combination –oidea for superfamilies, found in 281 generic names. To distinguish between both kinds of name, the italicisation of suprageneric names should be formally prohibited. Another ending to

Table 2. Ending presence and connector use in genus-group names in Zoology
Comments are in brackets and correspond to the list below the table.

[1, 2]	- Ø -	- ace -	- ari -	-ariin-	- ic -	-icin-	- id -	-idin-	- iform -	- in -	-inac-	-inin-	- iod -	-iodin-	- ion -	-ionin-	- od -	-odin-	- oid -	-oidin-	- oil -	- oin -	- omorph -	-omorphin-	- on -	-onin-	- ozo -	-ozoid -
1	-ae 30	[4]					[5]			[6]									[10]			[10]					1		[3]
2	-a 152,555	40	2,547	2	1,197	57	782	136	30	[8]9,062	40	6	19	149	12	511	186	58	20	17	[10]	54	702	19	1,422	112	17	1
3	-ia 47,308	1	1		236		1,093		13	1,386		8		54		310		32		8	8		4		2,663		1	
4	-na 405				3		2			8																		
5	-us 79,675	17	302		922		254			4,419		86		70		1,129		20		13	5		354		1,162		5	
6	-es 24,647		3		9		5,713			53		438	2	10		3,185	4	4,776		1					67			
7	-i 164	1								[7] 2															1			
8	-oi 1																											
9	-ii																											
10	-ea 6,152		1		57		822			206				18		52		[9]281			1				101		1	
11	-ees 8						3																					
12	-ei 8						1				1							1										

1. Lines numbered 1-7 belong to standard Latin nominative plural endings (shown in second column in the same order as in table 1), 8-12 are non-standard but have been used occasionally in Zoology. Headings for columns show connectors that may link the stem to the ending, in alphabetical order, the symbol Ø stands for the absence of such a connector. Figure in each cell is the number of hits in Neave for genera with this combination of connector+ending until 1994. In some cases it is approximate.
2. Other endings checked for coincidence with botanical/prokaryotic names: -phyta (13), -mycota (1), -phytina (2), -mycotina (0), -phyceae (0), -mycetes (2), -opsida (13), -phycidae (0), -mycetidae (0), -ales (64), -ineae (0).
3. Ending in –ozoidae may collide with family names derived from genera ending in –ozoa (17), -ozous (5), -ozoon (102) or –ozoum (43).
4. Ending in –aceae likely to be confused with a plant family.
5. Ending in –idae already in use in Zoology for families.
6. Ending in –inae already in use in Zoology for subfamilies.
7. Ending in –ini already in use in Zoology for tribes.
8. Ending in –ina already in use in Zoology for subtribes.
9. Ending in –oidea already in use in Zoology for superfamilies.
10. Ending in –oidae, -oinae or –oina may collide with family names derived from genera ending v.g. in –oa (748), -ous (189), -oon (137), oes (15) or –oum (63).

be discarded is –us (possible confusion with 2nd declension masculine nominative singular names, representing more than 25% of generic names). The ending –es could also fall into the same category, and is discussed in combination with the connectors.

Other duplicated occurrences of combinations of connector+ending between zoological genera and non-zoological categories are shown in the legend to table 2.

From table 2, it can be deduced that several types of ending are rare in other low-level taxon names, and thus are desirable as endings for the high-level taxa in order to establish a difference. These are: -ii (0 hits), -oi (1), -ei (11), -ees (11), -i (168).

Regarding connectors, table 2 gives also some that could be used in combination with these endings: -inac- (1), -ozoid- (1), -ariin- (2), -ionin- (12), -omorphin- (19), -oidin- (20), -iodin- (21), -ozo- (24), -inin- (40), -iform- (43), -oil- (49), -icin- (57), -ace- (59), -oin- (70). From these, those finishing in -in- can be discarded inmediately, since their combination with an –i ending would give the same ending –ini in use for tribes. This leaves –inac-, -ozoid-, -ozo-, -iform-, -oil- and –ace. I would suggest another possible ending, -omorph-, that is found as a part of generic names only in combination with endings –a, –ia, and –us, endings to be discarded from high-level names. A similar situation should be considered in evaluating the ending –es, which, although present in 24,647 genera, is never present in the combinations –inaces, -ozodes, -ozoes, -iformes, -acees and –omorphes, and only once as –oiles. I do not follow Rasnitsyn's (1992) recommendation of avoiding this ending.

If a system of endings is to be constructed with these connectors and endings, my view is that simple rules should be followed, ascribing a particular ending to every rank and a particular connector to every group, as intended by Starobogatov (1991). Thus, a combination of connectors (1 or 2) and a single ending will immediately indicate the rank of the nominal taxon. Secondary connectors are needed because of the scarcity of available, unmistakably different endings. Starobogatov's proposal results in a somewhat confused assignment of endings and connectors. For the phylum-group (which in his case includes as a rank the division, not considered here) he uses consistently the connector –ozo- or combinations of this and another connector (for example, -ace-); only the ending –ozoides has one hit as ending for a genus. For the class-group, he uses different connectors (-id-, -iod-, -ion-) and endings; of the resulting combinations, the one selected for the class (-iodes) has 438 hits as a genus ending and should be discarded. For the order-group, the connectors –omorph-, -iform-, -oid- and –oin- are used; hits are 0 or 1 for the combinations.

In my opinion, Starobogatov's system cannot be followed because of its lack of formal logic. My proposal is to use three well known connectors (already in use in some zoological taxa), each for one of the three levels (phylum-group, class-group, and order-group): respectively, -ozo-, -omorph- and –iform-. These will be combined with five mandatory endings for ranks as shown in table 3. Endings have been selected to avoid changes in some populated groups, such as fish, where they are in common use. The logical reasons for the endings are as follows: the first three (super-, (no prefix) and sub-) are simple and in alphabetical order: -ae, -es, -i; the last two (which are also less likely to be needed) have a secondary connector in alphabetical order (-ace- for infra-, -id- for parv(i)-), keeping the same preferred ending (-i). These two connectors are already in use in Zoology. If there is the belief that more ranks would be needed, the Commission could rule on the same logical basis. Taxon names ending in –ae will be first declension plural feminine substantives, while those ending

Table 3. Proposal of mandatory combinations (connector(s) + ending) for groups and ranks in Zoology

		Phylum	**Class**	**Order**
Category	Connector =>	-ozo-	-omorph-	-iform-
Super	-ae	-ozoae	-omorphae	-iformae
--- (no prefix)	-es	-ozoes	-omorphes	-iformes
Sub	-i	-ozoi	-omorphi	-iformi
Infra	-acei	-ozoacei	-omorphacei	-iformacei
Parv(i)	-idi	-ozoidi	-omorphidi	-iformidi

in –es and –i will be respectively third parisyllabic and second declension plural masculine substantives.

It is evident that this proposal is innovative and departs in several points from customary nomenclatural usage in some groups. However, as I have said in the introduction to this paper, the time is right to face such problems, in order to achieve uniform nomenclatural procedures in all animal taxa.

Structure of levels and typification

The above-mentioned statements are based on Starobogatov's acceptance of Rohdendorf's (1977) proposal to keep three different groups of names: phylum-group, class-group and order-group. The Principle of Coordination should apply to these three groups. Starobogatov differentiated the 'total coordination' proposal inherent in Rohdendorf's treatment (where all uninominal high-level names are merged with the family-group names) from his own, which considers the existence of these three groups as separate entities with separate internal coordination.

Even if Starobogatov's proposal is not accepted (and I will present strong reasons not to do so) the formal nomenclatural proposal here presented could be maintained, based on sound logical ground.

Rohdendorf's proposal was rejected on the principle that 'in doing so, the quantity of names, authors and dates does not grow very much, and the nomenclatural stability of higher-rank taxa is secured more dependably . . . and the names of higher taxa are based primarily on the best known and characteristic genera'. This concern is basic for a system that attempts to incorporate all available names. This would not be an onerous task. He went on: 'In so doing, the name of a taxon may be formed from any available generic name regardless of which family-group name was published earliest'. This statement is the weakest point in Starobogatov's system, since the level at which to seek a type-bearing taxon for all high-level taxa should be the genus-group, ignoring the family-group names. This procedure is directly contrary to the Principle of Typification, and would render any Code established on such a procedure deeply illogical.

A 'three-group system of coordination', as Starobogatov called it, cannot be allowed to undermine the Principle of Typification. In Starobogatov's concept, the three groups (phylum-, class- and order-groups) would be typified in any included genus whose name was used to typify any high-level taxon name (that is, the family-group names would be discarded). If we strictly follow the rationale of the

Code, a phylum-group name should be typified with the oldest available class-group name, this in the oldest available order-group name, and the latter in the oldest family-group name (with the appropriate ending changes).

Starobogatov states: 'With a three-group system of coordination, we can calmly consider names of the order-group and the family-group, even ones based on the same genus, as originating independently, and to ascribe to them different authors and dates of publication'. This is, plainly, not desirable. This procedure would add to the thousands of uninomina already in use for family-group names, many others with different authors and dates (which would be found in the older literature), and, what is worse, much more debate on precedences, with the consequent requests to the Commission.

According to this, it would seem that we would then have to decide whether we consider high-level taxa divided into a 'three-group system of coordination' as Starobogatov (1991) proposed (with a stairway typification system, not with his typification directly to genus for each level), or whether we consider them to be a 'single-group system of coordination' (Rohdendorf, 1977). In any case, the unique type-bearing taxon should be sought in the family-group.

Instead, I am proposing here that we be pragmatic and use what we already have. In the current (4th Edition) Code, we already have a uninominal level in use and well established: the family-group names. This group has names already typified in genera, and because time, and consequently Priority, is the main criterion, the oldest family-group names are usually based on the oldest (or at least the best known) generic names. I propose here simply to expand the family-group to include all the uninominal names above the genus-group, to be called the 'upper uninominal group'.

In this system, phylum-group, class-group, order-group and family-group would each become a subgroup. Only names given in the family-subgroup would be available for nomenclatural purposes. In the family-subgroup, they would keep author and date as a complementary attribute, but author would not be necessary for taxa above the family-subgroup. Names in the phylum-, class- and order-subgroup would have date only, in order to determine their priority. Typified names given for a taxon in a rank above the family-subgroup would not be available.

The new groups of names

According to the above proposal, the zoological categories would be gathered into three different groups (or coordination levels):

The 'upper uninominal group'. Its defining characters being plural substantive uninomina that never unite to the specific epithet to form a name, typified on a genus group name, formed by its stem and a set of connectors and endings. To be written in plain fonts.

The 'genus group' ('lower uninominal group'). Its defining characters being singular substantive uninomina that may unite to the specific epithet to form names of the 'species group', typified on a species group name. To be written in a different font from the rest of the text, usually italics.

The 'species group'. Its defining characters being binomina or trinomina, typified on specimens (extant or not). To be written in a different font from the rest of the text, usually italics.

Transition from contemporary nomenclature

This ruling would alter only minimally the usual names of many taxa. In some cases, just one or two letters may change in typified high-level taxa and the main concept behind the old name is easily recognisable. The addition of a type taxon for comparison and teaching is also an enormous advantage, including the diminution of the necessary effort of memory to learn names that have nothing to do with the included taxa names. An example is to be found for Arthropoda in table 4, following the endings presented in table 3. As can be seen, most of the resulting names are older than those in use, adding to an increasing stability of nomenclature ('the older the name, the more difficult to find one displacing it').

But, what happens with non-typified nominal taxa? Starobogatov (1991) commented: 'The most simple and radical solution is to reject all descriptive names and change them to typified names. . . . However, . . . such a sudden reform is absolutely impossible since it arouses a resolute protectiveness in all zoologists who are accustomed to certain names . . .'. Zoologists were also accustomed to names like Gephyrea or Vermes, which are no more in use. Some other 'scientific' names, like Reptilia, are used in a more vernacular sense. Of course, implementation of a system of typified high-level names cannot happen overnight.

The new Code should protect the use of typified names by making its naming mandatory side-by-side with non-typified names in those papers where new taxa are described. Descriptions of non-typified names should be considered unavailable. On the other hand, publication of uninominal names in the genus-group with the same endings as the 'upper uninominal group' names should also be prohibited, to avoid (hemi)homonymy. The implementation of obligatory registration of all zoological names could play a major role in eliminating errors. Non-typified names would eventually disappear. There are only two ways of keeping them, and both are far from satisfactory:

(1) To maintain them for the lowest taxon (in a phylogeny) lumping together all the included taxa in a rank, e.g. genus. As has been repeatedly pointed out, this would make Amphibia Linnaeus, 1758 identical with, and having priority over, Vertebrata Lamarck, 1801, since it originally included the genus *Petromyzon* Linnaeus, 1758 (Class Cephalaspidomorphi). Moreover the name Nantes Linnaeus, 1758 (forming a taxon under his Amphibia) would also be a synonym, containing the same genus. Following this rule would undoubtedly change the meaning of many names.

(2) The other possibility is typification based on one of the included typified taxa of lower rank (either families or genera). Since this has not occurred before, if the new Code allows it, it would lead to a frenetic race for type taxon designation and innumerable applications to the Commission to resolve conflicting typifications.

Neither of these solutions is desirable. Non-typified names must disappear in 21st century zoological nomenclature.

In the case of the few typified names having available names with the same precedence, a ruling of the Commission (acting as First Reviser or under the Plenary Power) selecting the most appropriate name after consulting with interested zoologists would be desirable, e.g. in the case of Order Coleoptera Linnaeus, 1758 (the original meaning included also cockroaches, crickets and earwigs!) that could be named (following the present proposal): Scarabaeiformes, Carabiformes,

Table 4. Nomenclature of a subphylum of Arthropoda and of Order Coleoptera, following the present proposal in table 3. This is just a 'scherzo' and some names may have available alternatives. I have selected those I consider less disruptive. Some fossil taxa have not been considered, although in a formal proposal they should be, unless ruled otherwise.

- ● Subphylum **Scorpionozoi** 1802 (= Cheliceromorpha Boudreaux, 1978)
  - Supercl. **Scorpionomorphae** 1802 (= Chelicerata Heymons, 1901)
    - Cl. **Scorpionomorphes** 1802 (= Merostomata Fage, 1968)
      - Subcl. **Limulomorphi** 1885 (= Xiphosura Latreille, 1802)
        - Ord. **Limuliformes** 1885 (= Limulida Richte & Richte, 1929)
      - Subcl. **Scorpionomorphi** 1802 (= Scorpionoidea Van der Hammen, 1975)
        - Ord. **Scorpioniformes** 1802 (= Scorpiones Latreille, 1810)
    - Cl. **Acaromorphes** 1802 (= Arachnida Lamarck, 1801)
      - Subcl. **Araneomorphi** 1806 (= Megoperculata Börner, 1902)
        - Ord. **Eukoeneniiformes** 1955 (= Palpigradi Thorell, 1888)
        - Ord. **Thelyphroniformes** 1835 (= Uropygi Thorell, 1900)
        - Ord. **Hubbardiiformes** 1899 (= Schizomida Petrunkevitch, 1949)
        - Ord. **Phryniformes** 1852 (= Amblypygi Thorell, 1900)
        - Ord. **Araneiformes** 1806 (= Araneae Clerck, 1758)
      - Subcl. **Acaromorphi** 1802 (= Acaromorpha Dubinin, 1957)
        - Ord. **Ixodiformes** 1833 (= Parasitiformes Reuter, 1909)
          - Subord. **Dermanyssiformi** 1859 (= Gamasida, Mesostigmata)
          - Subord. **Ixodiformi** 1833 (= Ixodida Leach, 1815)
          - Subord. **Holothyriformi** 1882 (= Holothyrida)
          - Subord. **Opilioacariformi** 1902 (= Opilioacarida)
        - Ord. **Acariformes** 1802 (= Acariformes)
          - Subord. **Trombidiiformi** 1815 (= Actinedida)
          - Subord. **Acariformi** 1802 (= Acaridida Latreille, 1802)
          - Subord. **Carabodiformi** 1837 (= Oribatida Dugès, 1834) (This name would be Oribatiformi if family Oribatidae and genus *Oribata* Latreille, 1802 were correctly used by acarologists.)
      - Subcl. **Phalangiomorphi** 1802 (= Dromopoda Shultz, 1990)
        - Ord. **Phalangiiformes** 1802 (= Opiliones Sundevall, 1833)
        - Ord. **Poliocheriformes** 1884 (= Ricinulei Thorell, 1892)
        - Ord. **Solpugiformes** 1815 (= Solifugae Leach, 1815)
        - Ord. **Cheliferiformes** 1826 (= Pseudoscorpiones Pavesi, 1880)
      - Subcl. **Eophrynomorphi** 1882 (= Soluta Petrunkevitch, 1849)
        - Ord. **Anthracomartiformes** 1890 (= Anthracomarti Karsch, 1882)
        - Ord. **Eophryniformes** 1882 (= Trigonotarbi Petrunkevitch, 1849)
  - Supercl. **Pycnogonomorphae** 1878 (= Pycnogonida Latreille, 1810)
    - Cl. **Pycnogonomorphes** 1878
      - Subcl. **Pycnogonomorphi** 1878
        - Ord. **Palaeopantopodiformes** 1978 (= Palaeopantopoda Broili, 1930)
        - Ord. **Pycnogoniformes** 1878 (= Pantopoda Gerstäcker, 1863)
- ● Ord. **Scarabaeiformes** 1802 (= Coleoptera Linnaeus, 1758)
  - ○ Subord. **Cupediformi** 1836 (= Archostemata Kolbe, 1898)
  - ○ Subord. **Sphaeriusiformi** 1845 (= Myxophaga Crowson, 1955)
  - ○ Subord. **Carabiformi** 1802 (= Adephaga Clairville, 1806)
  - ○ Subord. **Scarabaeiformi** 1802 (= Polyphaga Emery, 1886)
    - ■ Infraord. **Staphyliniformacei** 1802 (= Staphyliniformia Lameere, 1900)
    - ■ Infraord. **Scarabaeiformacei** 1802 (= Scarabaeiformia Crowson, 1960)
    - ■ Infraord. **Byrrhiformacei** 1804 (= Elateriformia Crowson, 1960)
    - ■ Infraord. **Bostrichiformacei** 1802 (= Bostrichiformia Forbes, 1926)
    - ■ Infraord. **Cucujiformacei** 1802 (= Cucujiformia Lameere, 1938)

Hydrophiliformes, Staphyliniformes, Bostrichiformes, Cucujiformes, Cleriformes, Tenebrioniformes, Chrysomeliformes or Curculioniformes. There is also the possibility of taking into consideration the date of precedence of the non-typified name

being replaced in the competition for naming higher rank taxa: e.g. the name Termitiformes 1802 would have precedence over Perliformes 1802 for the replacement naming of Polyneoptera Martynov, 1925 (with the appropriate ending change) since the first name is replacing Isoptera Brullé, 1832, which has precedence over the name Plecoptera Burmeister, 1839, replaced by Perliformes.

The application of the system here presented would allow quick finding of available names for every desired category with information on authors and dates for the families included.

Proposals to the Commission

I expect that the aforementioned opinions and proposals will need to be considered by the compilers of the next edition of the Code. Those of us having a commitment to nomenclature must face the fact that conservatism is good up to a certain point, but can be counter-productive if maintained irrespective of necessary developments.

I therefore urge the Commission to begin in-depth discussion of the above-mentioned proposals (and of those of my predecessors) to identify those best meeting the needs of zoologists in the 21st century and to draft them for incorporation in the Code.

Unlike Starobogatov, I will not propose a set of rules to be taken into consideration. Although I think that my proposals are logical and Code-compliant (with the suggested amendments), I consider that my fellow members of the Commission and, indeed, all working zoologists still have to give their views.

However, my views can be summarised as follow:

The new Code must regulate those uninomina above the family-group, usually known as phylum-, class- and order-group names.

Non-typified names must be discarded in high-level taxa nomenclature. No new non-typified name will be available after the new Code is in force.

Typified high-level regulated names must be introduced gradually and in accordance with the Code. Non-typified names in publications must be accompanied by the corresponding typified names, and use of non-typified names alone should be prohibited by the Code. New taxa described only under non-typified names should not be made available.

A logical set of standardized connectors and endings, such as those proposed here (table 3), should be incorporated in the new Code.

Instead of creating either three groups above the family-group (phylum-group, class-group and order-group) or a single group encompassing all of them, I propose the expansion of the family-group name to form an 'upper uninominal group'.

This group would be typified by the names in the immediately inferior group (the genus-group) as is the standard in the present Code. This way, the internal logic of the Principle of Typification is maintained.

Depending upon the decision of the Commission, names for this 'upper uninominal group' could be taken directly from the existing family-group names or, alternatively, extant typified names for upper categories could enter into competition by precedence. It would not be necessary to give authors for these names. With this action, unnecessary efforts will be avoided, since most of the names needed are already available.

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